

**Missouri Department Of Natural Resources**

Division of Geology and Land Survey
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Project ID Number

LWE12026

County

HOWELL**Geohydrologic Evaluation of Liquid Waste Treatment Site**

Project **Coastal Energy Corporation** Quadrangle **WILLOW SPRINGS SOUTH**
Location **SE1/4** Section **32** Township **27 N** Range **9 W**
Additional Location Information
Latitude **36 Deg 58 Min 17 Sec** Longitude **91 Deg 57 Min 4 Sec**

Owner Coastal Energy Corporation
(417) 469-2777
PO Box 218 Willow Springs MO 65793

Preparer Heider Environmental Consulting
(573) 445-3033
Curtis Heider
14 Bright Star Drive Columbia MO 65203

Previous Report ☒ Not Applicable

Date

Identification Number

Fiscal Year

Facility Type	Type of Waste	Funding Source
<input type="radio"/> Mechanical treatment plant	<input type="radio"/> Animal	<input checked="" type="radio"/> PPG
<input type="radio"/> Recirculating filter bed	<input type="radio"/> Human	<input type="radio"/> WWLF-SRF
<input type="radio"/> Earthen lagoon with discharge	<input type="radio"/> Process or Industrial	<input type="radio"/> Non-Point Source
<input type="radio"/> Earthen holding basin	<input type="radio"/> Leachate	Other Information
<input checked="" type="radio"/> Land application	<input checked="" type="radio"/> Other waste type	<input type="radio"/> Plans were submitted
<input type="radio"/> Other type of facility		<input type="radio"/> Site was investigated by NRCS
		<input type="radio"/> Soil or geotechnical data were submitted

Date of Report 10/6/2011 **Stream Classification** ☐ Gaining ☐ Losing ☒ No discharge

Overall Geologic Limitations	Soil Permeability	Topography	Landscape Position
<input type="radio"/> Slight	<input checked="" type="radio"/> Not applicable	<input checked="" type="radio"/> < 4%	<input type="radio"/> Broad uplands <input checked="" type="radio"/> Floodplain
<input type="radio"/> Moderate	<input type="radio"/> Slight	<input type="radio"/> 4% to 8%	<input type="radio"/> Ridgetop <input type="radio"/> Alluvial plain
<input type="radio"/> Severe	<input type="radio"/> Moderate	<input type="radio"/> 8% to 15%	<input type="radio"/> Hillslope <input type="radio"/> Terrace
	<input type="radio"/> Severe	<input type="radio"/> > 15%	<input type="radio"/> Narrow ravine <input type="radio"/> Sinkhole

Bedrock The upper-most bedrock is of Ordovician-age Jefferson City Dolomite.

Surficial Materials The surficial materials are approximately 50 feet thick and composed of alluvial sediment ranging from clay to gravel

Recommended Construction Procedures

- ☐ Installation of clay pad ☐ Diversion of subsurface flow ☐ Rock excavation
☐ Compaction ☐ Artificial sealing ☐ Limit excavation depth

Required Geologic Exploration

(Missouri Clean Water Commission - 10,000 - 20,000 Wastewater Treatment Ponds)

Determine Overburden Properties

- ☐ Particle size analysis ☐ Standard Proctor density ☐ Permeability coefficient for undisturbed sample
☐ Atterburg limits ☐ Overburden thickness ☐ Permeability coefficient for remolded sample

Determine Hydrologic Conditions

- ☐ Groundwater elevation ☐ Direction of groundwater flow ☐ 25-year flood level ☐ 100-year flood level

When to Explore

- ☐ Before exploration ☐ During construction ☐ After construction ☒ Not necessary

Remarks

On October 6, 2011, a geohydrologic evaluation was conducted by Christopher Vierrether of the Missouri Geological Survey Program per the request of Mr. Curtis Helder of Helder Environmental Consulting for the proposed land application of storm water containment collection. The goal of this evaluation is to determine the geologic and hydrologic elements of the site as they relate to the facility's construction and the potential for groundwater contamination in the event that treatment failure occurs. The proposed application area is composed of a pastured forty-acre tract located on the Willow Springs South 7.6' Quadrangle in the SE¼, section 32, T. 27 N., R. 9 W., Howell County, Missouri.

The upper-most bedrock is of Ordovician-age Jefferson City Dolomite. This unit is composed of fine to medium crystalline dolomite with interbedded sandstone. Nodular chert is sporadically present in the dolomite. The presence of a losing stream and numerous sinkholes in the area indicates the site is situated in a karst environment and the Jefferson City Dolomite has a high permeability in this vicinity.

The surficial materials have a total thickness of about 50 feet and appear to be composed of alluvial sediments ranging in size from clay to gravel. The upper surficial materials are dominated by silty clay to clay which is probably underlain by coarser alluvial materials. Based on the high volume of coarser materials typically associated with an alluvial setting, these surficial materials are likely to have a high permeability.

The 40-acre pastured site is situated in the floodplain of the Eleven Point River. Numerous sinkholes surrounding the area, and the losing streams (Eleven Point River and an unnamed tributary) that bound the site, strongly suggest the presence of karst. The southern portion of the site appeared hummocky and low areas contained throats, suggesting the presence of sinkholes in this area. The northern portion does not display the hummocky landscape or throats present in the southern portion. However, effluent applied to both areas will likely experience rapid vertical migration and infiltration.

Based on the geologic and hydrologic characteristics observed during the visit, the 40-acre tract should be split into two different land application sites. The southern portion contains evidence of active sinkhole formation. Land application on this site would allow effluent to quickly migrate into the underlying bedrock and regional water supply. The northern portion tract does not display active sinkhole formation and appears suitable for land application of effluent. If treatment of the waste should fail, the effluent could impact the regional water supply.

This document is a preliminary report. It is not a permit. Additional data may be required by the Department of Natural Resources prior to the issuance of a permit. This report is valid only at the above location and becomes invalid one year after the report date below.

Report By: Chris Vierrether
CC SERO; WPP

Report Date: 11/28/2011

